



FINAL REPORT

AIC 19 - 1003

TRIBAL AURORA HELICOPTERS

P2-TAH

Airbus Helicopters MBB BK117 C-1

Unintended Flight into IMC

2.7 nm south east of Silur Airstrip, New Ireland Province

Papua New Guinea

13 September 2019



ABOUT THE AIC

The Accident Investigation Commission (AIC) is an independent statutory agency within Papua New Guinea (PNG). The AIC is governed by a Commission and is entirely separate from the judiciary, transport regulators, policy makers and service providers. The AIC's function is to improve safety and public confidence in the aviation mode of transport through excellence in independent investigation of aviation accidents and other safety occurrences within the aviation system; safety data recording and analysis; and fostering safety awareness, knowledge, and action.

The AIC is responsible for investigating accidents and other transport safety matters involving civil aviation in PNG, as well as participating in overseas investigations involving PNG registered aircraft. A primary concern is the safety of commercial transport, with particular regard to fare-paying passenger operations.

The AIC performs its functions in accordance with the provisions of the *PNG Civil Aviation Act 2000 (As amended)*, and the *Commissions of Inquiry Act 1951*, and in accordance with *Annex 13* to the *Convention on International Civil Aviation*.

The objective of a safety investigation is to identify and reduce safety-related risk. AIC investigations determine and communicate the safety factors related to the transport safety matter being investigated.

It is not a function of the AIC to apportion blame or determine liability. At the same time, an investigation report must include relevant factual material of sufficient weight to support the analysis and findings. At all times the AIC endeavours to balance the use of material that could imply adverse comment with the need to properly explain what happened, and why it happened, in a fair and unbiased manner.

A handwritten signature in black ink, appearing to read 'Hubert Namani', is written over a light grey rectangular background. The signature is stylized and includes a large circular flourish on the left side.

Hubert Namani, LLB
Chief Commissioner
31 December 2020

About this report

On 13 September 2019, at 02:27 UTC (12:27 local time), the AIC received information from Manolos Aviation about the accident involving an Airbus Helicopters MBB BK117 C-1 helicopter registered P2-TAH, in the coastal area of New Ireland Province. The AIC immediately commenced an investigation. At 04:31 PNG Air Services Limited (PNG ASL) sent an initial notification of the occurrence to the AIC.

This *Final Report* was produced by the PNG AIC, PO Box 1709, Boroko 111, NCD, Papua New Guinea and the Commission has made it publicly available in accordance with ICAO Annex 13, Chapter 3, paragraph 6.5. It will be published on the PNG AIC website.

The report is based on the investigation carried out by the AIC under the Papua New Guinea *Civil Aviation Act 2000 (As Amended)*, and *Annex 13 to the Convention on International Civil Aviation*. It contains factual information, analysis of that information, findings and contributing (causal) factors, other factors, safety actions, and safety recommendations.

Although AIC investigations explore the areas surrounding an occurrence, only those facts that are relevant to understanding how and why the accident occurred are included in the report. The report may also contain other non-contributing factors which have been identified as safety deficiencies for the purpose of improving safety.

Readers are advised that in accordance with *Annex 13 to the Convention on International Civil Aviation*, it is not the purpose of an AIC aircraft accident investigation to apportion blame or liability. The sole objective of the investigation and the final report is the prevention of accidents and incidents (Reference: *ICAO Annex 13, Chapter 3, paragraph 3.1*). Consequently, AIC reports are confined to matters of safety significance and may be misleading if used for any other purpose

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GLOSSARY OF ABBREVIATION

AFTN	: Aeronautical Fixed Telecommunication Network
AIC	: Accident Investigation Commission
AMSL	: Above Mean Sea Level
ADSB	: Automatic Dependent Surveillance-Broadcast
ARCC	: Aeronautical Rescue Coordination Centre
ATC	: Air Traffic Control
ATM	: Air Traffic Management
BKN	: Broken Clouds
CAR	: Civil Aviation Rules
CASA PNG	: Civil Aviation Safety Authority of Papua New Guinea
CEO	: Chief Executive Officer
CNS	: Communication, Navigation and Surveillance
CoA	: Certificate of Airworthiness
CU	: Cumulus Clouds
CVR	: Cockpit Voice Recorder
DME	: Distance Measuring Equipment
ELT	: Emergency Locator Transmitter
ERP	: Emergency Response Plan
FIR	: Flight Information Region
FG	: Fog
FIS	: Flight Information Services
FOM	: Flight Operations Manual
GNSS	: Global Navigation Satellite System
GPS	: Global Positioning System
HF	: High Frequency
ICAO	: International Civil Aviation Organization
IFR	: Instrument Flight Rules
L	: Litres
LAME	: Licensed Aircraft Maintenance Engineer
m	: Metres
MATS	: Manual of Air Traffic Services
MC	: Maintenance Controller
MFO	: Manager Flight Operations
MOC	: Maintenance Organisation Certificate
MRCC	: Marine Rescue Coordination Centre
MTC	: Manager Training and Competency
NAC	: National Airports Corporation
nm	: Nautical Miles
NQAS	: North Queensland Aviation Services
NWS	: National Weather Service
PNGASL	: Papua New Guinea Air Services Limited
PCPN	: Precipitation
PPM	: Policy and Procedure Manual
QMS	: Quality Management System
RADZ	: Rain and Drizzles
SAR	: Search and Rescue

SCT	: Scattered Clouds
SHRA	: Showers and Rain
SMS	: Safety Management System
SOP	: Standard Operating Procedure
ST	: Stratus Clouds
TSRA	: Thunderstorms and Rain
UTC	: Universal Time Coordinated
VFR	: Visual Flight Rules
VHF	: Very High Frequency
VOR	: Very High Frequency Omni-Directional Range

INTRODUCTION

SYNOPSIS

On 13 September 2019, at about 01:15 UTC (11:15 local time), an Airbus Helicopter MBB - BK117 C-1, registered P2-TAH, owned by Southern Cross Aircraft Engineering (SCAE) and operated by Tribal Aurora Helicopters (TAH) was on a VFR positioning flight from Buka Airport, Autonomous Region of Bouganville to Tokua Airport, East New Britain Province, Papua New Guinea, when it impacted water approximately 2.7 nautical miles (nm) southeast of Silur, New Ireland Province.

At 02:27 UTC (12:27 local time), the AIC received information from Manolos Aviation about the accident and at 04:31, PNG Air Services Limited (ASL) notified AIC by providing an Initial Notification Incident (INI) Report.

There were two persons on board: 1 pilot and 1 passenger. The passenger was the sole survivor. The helicopter submerged and was subsequently destroyed. The final resting position of the wreckage was not identified.

On the day of the occurrence at about 00:20, P2-TAH departed Buka to Tokua as the planned destination and intended to track on the 110 radial of the Tokua VOR.

The investigation found that during flight, the pilot encountered deteriorated weather conditions. Subsequently, he tried to divert but the weather was further deteriorating as the flight progressed, to an extent in which the pilot was unable to maintain visual references.

At 01:15 approximately, while the pilot was maneuvering to recover visual references, the aircraft descended and impacted the water approximately 2.7 nm South East of Silur Airstrip, New Ireland Province.

At 01:15, 10 minutes before P2-TAH revised estimated arrival time, Tokua Tower made a normal radio communication checking on P2-TAH, however, there was no response which eventually prompted the search and rescue operation to be initiated.

The passenger was rescued by an Operator participating in the Search and Rescue Operation. The pilot was fatally injured and his body was later recovered by locals from the sea, near the area of the accident.

1 FACTUAL INFORMATION

1.1 History of the flight

On 13 September 2019, at about 01:15 UTC¹ (11:15 local time), an Airbus Helicopters MBB-BK117 C-1 helicopter, registered P2-TAH, owned by Southern Cross Aircraft Engineering (SCAE) and operated by Tribal Aurora Helicopters, was on a VFR² flight from Buka Airport, Autonomous Region of Bougainville, to Tokua Airport, East New Britain Province, Papua New Guinea when it impacted the water 2.7 nautical miles (nm) South East of Silur Airstrip, New Ireland Province.

According to the Operator, the pilot had planned a positioning flight to Mt. Hagen via Tokua Airport, Hoskins Airport and Nadzab Airport (See Figure 1).



Figure 1: Overview of the planned repositioning flight (Source: Google Earth image)

At 00:17, the pilot called and informed Flight Information Services (FIS) that he was departing Buka for Tokua and his estimated time of arrival (ETA) was 01:10. He also informed FIS that he intended to track along the 110 radials on the Tokua VOR³.

The Spidertracks⁴ recorded data showed that at 00:31, the aircraft was 22 nm from Buka Airport, maintaining a track via the 110 radial on the Tokua VOR and cruising at 2,540 ft. At 00:33, the helicopter began to deviate

¹ The 24-hour clock, in Coordinated Universal Time (UTC), is used in this report to describe the local time as specific events occurred. Local time in the area of the accident, Papua New Guinea Time (Pacific/Port Moresby Time) is UTC + 10 hours

² Visual flight rules: as prescribed by national authority for visual flight, with corresponding relaxed requirements for flight instruments (Source: *The Cambridge Aerospace Dictionary*)

³ VOR: Very High Frequency omni-directional radio range, comprises a fixed beacon emitting fixed circular horizontal radiation pattern at 108-118MHz. An airborne station can read from a panel instrument bearing of aircraft from station, called inbound or outbound radial. (Summarized from Cambridge Aerospace Dictionary)

⁴ A satellite tracking device for aircraft. This enables the aircraft's position to be monitored from an internet-connected device. It includes an 'SOS' button, which can be manually activated by the crew in an emergency.

from its planned track, towards the north. According to the passenger⁵, the deviation was to avoid entering adverse weather ahead, along the planned track. The Spidertracks data also showed that from 00:31 to 00:49, the helicopter descended from 2,540 ft to 1,333 ft.

At 00:49, 63 nm from Buka, the pilot made a routine report informing FIS that operations were normal, below 5,000 ft AMSL. He also reported a revised ETA of 01:25. The pilot was instructed by FIS to call Tokua Tower at 25 DME⁶. This was the last radio communication between the pilot and FIS.

The Spidertracks data showed that at 01:03 the helicopter was positioned 10 nm North East of the 110 radials at 397 ft. The passenger informed investigators that around that point, the helicopter entered further deteriorating weather conditions. The AIC determined from the passenger's weather description that the helicopter was in Instrument Meteorological Conditions (IMC) by that time. He recalled the pilot revising the destination on the Global Positioning System (GPS) from Tokua to a position which he believed was the nearest land, around the South East coastal area of New Ireland. The helicopter subsequently entered an area of heavy rainfall with thunderstorms.

The last recorded data point at 01:15 showed the helicopter at an altitude of 217 ft and groundspeed of 62 kt, less than a mile from the Southern coast of New Ireland.

Based on the passenger statement, the AIC determined that after the last recorded data point and as the helicopter continued tracking towards the revised position, it descended and slowed down to less than 5 kt prior to impacting the water.

There was no Emergency Locator Transmitter (ELT) signal transmitted after the impact.

At 01:15, Tokua Tower made a normal radio communication check on P2-TAH, however, there was no response. Tokua Tower continued radio communication checks and by 01:28 (3 minutes after ETA), FIS declared the first search and rescue (SAR) phase⁷, the Uncertainty Phase (INCERFA). This was followed by the Alert Phase (ALERFA) at 01:30 and later upgraded to the Distress Phase (DETRESFA) at 01:55.

At 03:24, Tokua Tower informed the Rescue Coordination Center (RCC) that Manolos Aviation Limited was arranging search helicopter, P2-NTI, to conduct track line search for the distressed P2-TAH.

At 04:27, the pilot of P2-NTI reported that he had located the wreckage and rescued the passenger who had egressed the helicopter and swam to shore. Later that day, the body of the pilot was found and recovered from the sea by locals.

⁵ The passenger was a Licenced Aircraft Maintenance Engineer (LAME) but was not employed by the company in that capacity.

⁶ DME: Distance Measuring Equipment is a radio navigation technology that measures the slant range (distance) between an aircraft and a ground station by timing the propagation delay of radio signals in the frequency band between 960 and 1215 megahertz (MHz)

⁷ There are three SAR phases of emergency that have been established to classify emergency situations and to indicate the actions to be taken for each particular incident; i) Uncertainty phase; ii) Alert phase; and iii) Distress phase. (Source: PNGASL Manual of Air Traffic Service)

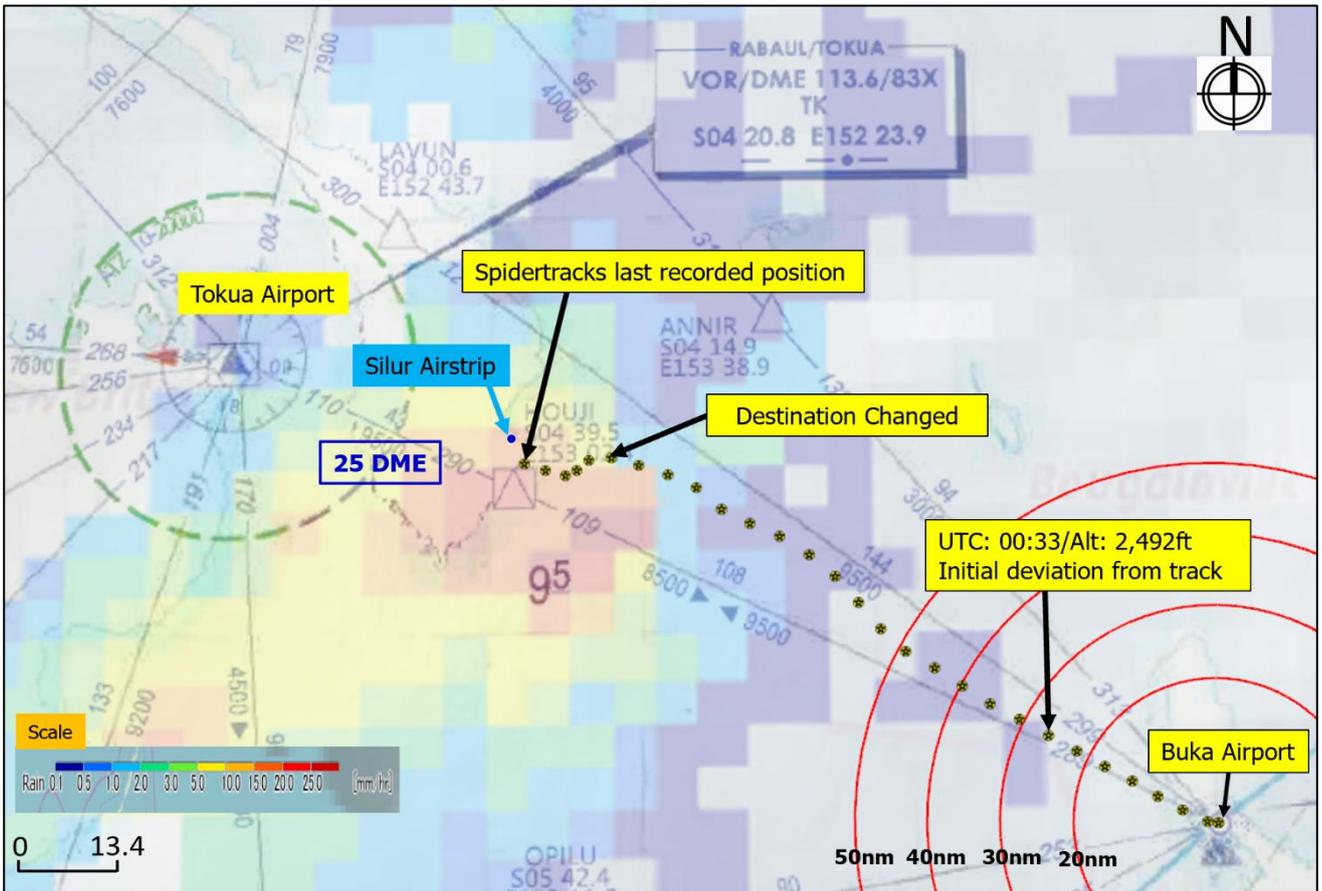


Figure 2: Depiction of the accident flight path into adverse weather conditions (Source: Spidertracks recorded positions data, PNG National Weather Service satellite image and PNG ASL Enroute Chart)

1.2 Injuries to persons

Injuries	Flight crew	Passengers	Total in Aircraft	Others
Fatal	1	-	-	-
Serious	-	-	-	-
Minor	-	-	-	Not applicable
Nil Injuries	-	1	-	Not applicable
TOTAL	1	1	2	-

Table 1: Injuries to persons

1.3 Damage to aircraft

The helicopter impacted water, submerged, and was subsequently destroyed. The final resting position of the wreckage was not identified.

1.4 Other damage

The investigation could not determine the extent of damage to the environment.

1.5 Personnel information

1.5.1 Pilot in command

Age	: 49 years old
Gender	: Male
Nationality	: Papua New Guinea
Position	: Line Pilot
Type of license	: PNG CPL H & A
Type rating	: BK117, DHC6, BH204/205, BH206, BH407
Total flying time	: ~11,500 hours
Total hours in command	: 4324.45 hours
Total hours on type	: ~300 hours
Total hours last 90 days	: 40.1 hours
Total hours last 90 days on type	: 40.1 hours
Total hours last 7 days	: 7 hours
Total hours last 24 hours	: 2.8 hours
Total hours last 24 hours on type	: 2.8 hours
Medical class	: Class 1
Valid to	: 13 September 2019
Medical limitation	: NIL

The pilot did not have a current IFR⁸ rating.

1.6 Aircraft Information

1.6.1 Aircraft data

Aircraft manufacturer	: Airbus Helicopters
Model	: MBB - BK117 C-1
Serial number	: 7504
Year of manufacture	: 1996
Total airframe hours	: 5,449.3 hours
Registration	: P2-TAH
Certificate of Registration number	: 385
Certificate of Registration issued	: 30 June 2019
Certificate of Registration valid to	: Non-Terminating

⁸ Instrument Flight Rules applied in cloud or whenever external cues are below VFR minima which prohibit non-IFR pilots/aircraft.

Name of the owner : Southern Cross Aircraft Engineering Services Pty Ltd
Name of the operator : Tribal Aurora Helicopters
Certificate of Airworthiness number : 385
Certificate of Airworthiness issued : 30 June 2019
Certificate of Airworthiness valid to : Non-Terminating

1.6.1.1 Engine data

Engine type : Turboshaft Engine
Year of Manufacture : June 1997
Manufacturer : Safran Helicopter Engines
Model : Arriel 1E2
No. 1 engine (Left)
Serial number : 18044
Total time since new : 1,370.2 hours
No. 2 engine (Right)
Serial number : 3052
Total time since new : 11,129.3

1.6.1.2 Airworthiness

At the time of the accident, the helicopter had a current Certificate of Airworthiness (CoA), Certificate of Registration (CoR), and was certified as being serviceable for flight.

1.6.1.3 Fuel

According to documents provided to the investigation, the fuel used was Aviation Turbine Fuel Jet A-1.

Before departing for the accident flight, the helicopter was refuelled with 400L (320 kg) of fuel. According to the passenger, he noted the fuel quantity shown on the gauge was over 400 kg.

According to the Operator, the flight planned fuel is based on consumption at Sea Level, and 60% Torque. This is equal to 4 kg per minute. With the amount of fuel on-board noted by the passenger and the flight planned consumption rate provided by the Operator, the fuel endurance would have been approximately 100 minutes of flight.

According to the Spidertracks data, the accident occurred no more than 59 minutes mark which would have approximately burned 232 kg of fuel. The investigation determined that there was sufficient fuel remaining in which it would have provided an approximate reserve of 40 minutes.

The passenger did not indicate any engine abnormality witnessed during the accident flight which could have been a sign of fuel starvation.

The investigation determined that fuel was not a contributing factor to the accident.

1.6.1.4 Maintenance

The last maintenance carried out on the helicopter was a scheduled 100-hourly Engine and Airframe inspection which was due on 10 September 2019 while the helicopter was operating in Buka. The maintenance was carried out by a LAME on the inspection due date at Buka Airport, and the helicopter was released to service. The investigation found that the maintenance was carried out in accordance with the Maintenance Manual.

The Operator had a service level agreement (SLA) with North Queensland Aviation Services⁹ (NQAS), a maintenance company based in Australia for all aircraft maintenance services. NQAS was *PNG CAR Part 145* approved Aircraft Maintenance Organisation.

The NQAS had a Memorandum of Understanding (MOU) with Central Aviation in Mount Hagen for the purpose of using their CAR Part 145 approved maintenance facility to provide maintenance services to their clients in PNG.

The investigation found that the 100-hourly inspection in Buka was not conducted in a CAR Part 145 approved facility.

1.6.1.5 Weight and Balance

Using the weight and cargo distribution information provided by the Operator to the AIC, it was determined that the helicopter was within its weight and centre of gravity limits.

1.6.1.6 Aircraft instruments and equipment

According to the Operator's *Air Operators Certificate Operations Specification*, the helicopter was equipped for VFR operations.

When meteorological conditions are below VFR minima, aircraft operations should be conducted under IFR, which require the aircraft to be equipped accordingly¹⁰ and the pilot to hold an appropriate current instrument rating¹¹.

1.7 Meteorological information

1.7.1 Area Forecast

The Area Forecast data obtained from PNG National Weather Service by the investigation was effective between 12 September 2019 at 23:00 and 13 September 2019 at 11:00. The Area Forecast states:

Winds	: 180°/20 kt at 2,000 ft, 170°/20 kt at 5,000 ft
Cloud	: 500-3,000ft - scattered stratus clouds with broken precipitation. 1,800-10,000ft - scattered cumulus clouds with broken showers and rain.
Visibility	: 500 m with fog, 3,000 m with thunderstorm and rain, 4,000 m with showers and rain or rain and drizzles (four-hourly interval from 23:00 on 12 September 2019 to 11:00 on 13 September 2019).

⁹ Refer to Section 1.17 Organizational and Management Information for more information on NQAS

¹⁰ Specific IFR equipment and instrument requirements are described in CAR Part 91.517.

¹¹ CAR Part 61.5(e)

Weather : thunderstorm and rain; showers and rain; and rain and drizzles (four-hourly interval from 23:00 on 12 September 2019 to 11:00 on 13 September 2019).

1.7.2 Satellite Weather Image

According to the Satellite image¹⁰ shown in Figure 3, there was presence of cloud along and around the flight path area indicated by the dark grey coloration.

According to the rainfall scale of the satellite image, the helicopter first entered IMC conditions with little rain (0.1-0.25 mm/hr) about 25 nm from Buka Airport, and as the pilot progressed the flight towards New Ireland, the weather continued to further deteriorate. The accident area is located where there is indication of very heavy rainfall (25 mm/hr).

The investigation determined that the accident site was in the middle of a storm cell.

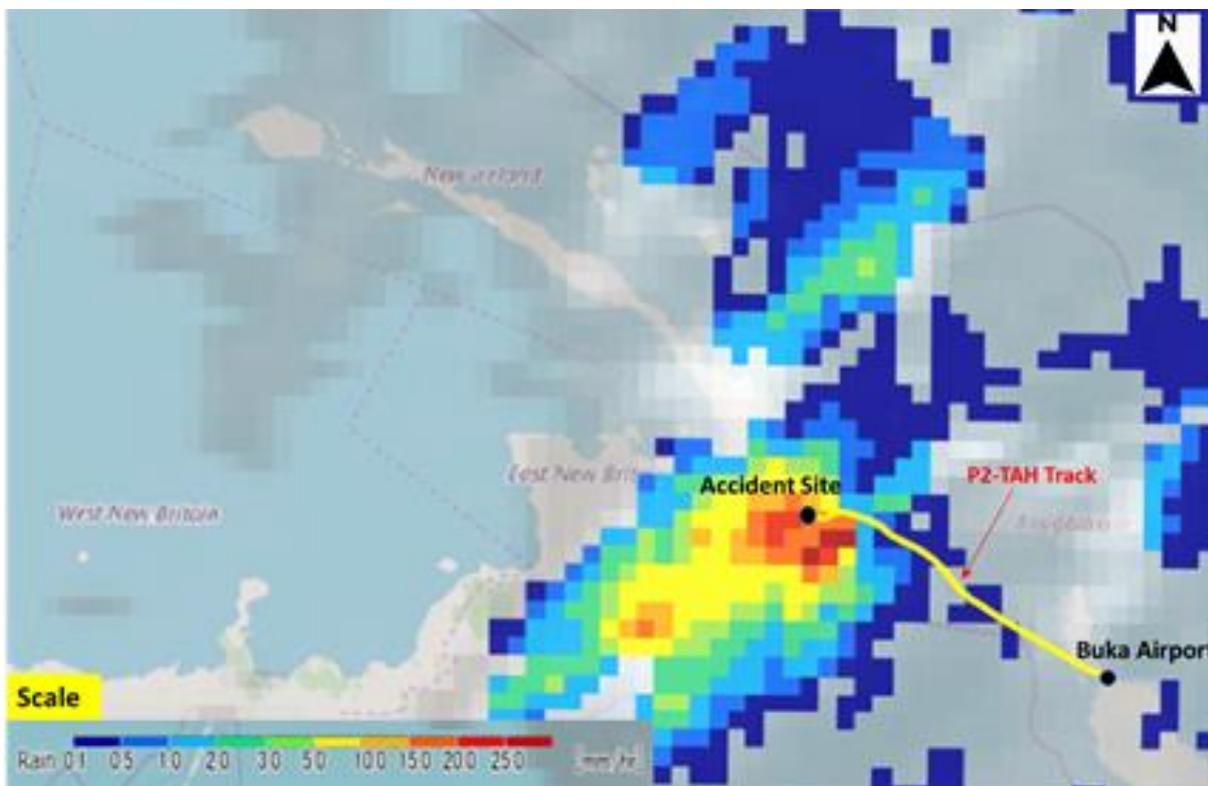


Figure 3: Satellite Weather Image current at the time of the accident. (Source: PNG Weather Services & annotated by AIC)

1.7.3 Weather Observation

1.7.3.1 Passenger

During interview, the passenger stated that the weather was fine when they departed from Buka Airport. However, the passenger estimated that when the helicopter was approximately 20 minutes out of Buka, the weather started to deteriorate, and he could see cloud build-up at New Ireland. The passenger explained that as the helicopter continued along the flight path, weather conditions further deteriorated at which point the pilot commenced descent and subsequently revised the destination on the GPS to the nearest land (New Ireland). The passenger indicated that as the helicopter continued to approach New Ireland, there were lightnings and rain.

1.7.3.2 Pilot for P2-MUM

P2-MUM departed Buka Airport approximately 20 minutes after P2-TAH, destined for Ulaveo, East New Britain Province. During an interview with the pilot, he stated that from experience, he preferred flying at a higher altitude in order to avoid cloud and subsequent wind movement. For this reason, he maneuvered the aircraft to an altitude of 5,600 ft at which he sighted weather conditions as cloudy. The pilot stated that while tracking, he could not see New Ireland province towards his right as it was dark, however, towards his left was not dark.

1.7.3.3 Weather during search and rescue

The pilot of the search helicopter, P2-NTI, stated that while operating out of Ulaveo, East New Britain, there was overcast at about 5,500 ft so he opted to operate at 10,000 ft. However, due to headwinds blowing at 10,000 ft, the pilot decided to descend to 500 ft. The pilot's following statement indicated that at 500 ft, he was experiencing difficulty in maintaining visual orientation due to foul visibility and as a result of operating over water. The pilot explained that it is difficult attempting to hold reference over water as there is no availability of stationary reference points. Therefore, he tracked towards land (New Ireland), and subsequently tracked along the coast of New Ireland conducting the search and rescue of P2-TAH.

1.8 Aids to navigation

Ground-based navigation aids, on-board navigation aids and aerodrome visual ground aids and their serviceability were not a factor in this accident.

1.9 Communications

According to the Moresby Flight Service (FIS) Officer, on duty, communications between P2-TAH and Moresby FIS were made on HF 8861. The FIS officer also stated that the readability of the HF 8861 facility was very poor due to static interference. Consequently, she had to stop all other activities and try to listen very closely to hear what was being said in order to facilitate coordination.

During the search period, the FIS officer asked the pilot of P2-NTI, the search aircraft, to call on HF 6622. She stated that readability on HF 6622 was slightly better than HF 8861.

The communication, at times were recorded on the flight service progress strip as shown in *Appendix B*.

The Air Traffic Control (ATC) audio recordings provided to the AIC by ATS were not readable.

The AIC noted that the HF quality deficiency was an ongoing issue and has been the subject of communication issues for several other AIC investigations. The issue first identified and highlighted by the AIC through the accident investigation reference *AIC 16-1002*, involving a Pilatus Britten Norman BN-2T aircraft, registered P2-SBC which occurred in Kiunga on 13 April 2016.

During the investigation, AIC issued a safety recommendation *AIC 16-R12-1002*, which was associated with ineffective HF communication system. The recommendation read:

The Accident Investigation Commission recommends that PNG Air Services Limited, should take action to improve High Frequency radio capability to ensure, as much as possible, that transmission is clear and readable so vital transmissions for the safety of aircraft operations are not missed.

PNG ASL responded, acknowledging the deficiency and stated the following:

On July 11, 2018, PNG Air Services Limited informed the Accident Investigation Commission that its program to deploy and commission duplicated Transmitter and Receiver systems located at Nadzab Airport, Lae had been delayed, but expected completion towards the end of 2018.

During this helicopter accident investigation, the AIC found that the upgrade of the HF system, up to the date of release of this report, has not been completed.

1.10 Aerodrome information

Not Applicable.

1.11 Flight recorders

The helicopter was not equipped with a flight data recorder (FDR) or a cockpit voice recorder (CVR), neither were they required by the PNG Civil Aviation Rules.

1.11.1.1 *Other electronic data recording device (Spidertracks)*

The Spidertracks tracking system is a web-based system which allows subscribed operators to track and monitor their aircraft using an internet connected device. A Spidertracks device, called the 'Spider' is installed on the aircraft to transmit GPS information in real-time.

P2-TAH had a Spider mounted directly in front of the pilot. It transmitted and recorded GPS coordinates, altitude, groundspeed, point type, bearing in real-time at 2-minute intervals.

It also has a function which allows pilots to manually transmit a SOS when in an emergency. This is achieved by pressing the SOS button which is installed with the Spider. The Spidertracks data did not show an SOS activation to indicate that P2-TAH was experiencing an emergency or distress situation.

Aircraft Tracking Systems is a process, established by the operator, that maintains and updates, at standardised intervals, a ground-based record of the four-dimensional position of individual aircraft in flight.

1.12 Wreckage and impact information

The main wreckage of the helicopter was not recovered. The left vertical fin below was found floating in the area near the last known coordinates. The damage observed on the components indicate that it ruptured upon impact with the water. The investigation identified these items as the tail section left vertical fin. See Figure 4.

The main wreckage of the helicopter was not recovered. The two airframe components were found floating in the area near the last known coordinates were left vertical fin from the tail of the helicopter. The investigation identified these parts to be left vertical fin split to upper and lower at the time of the impact.



Figure 4: Helicopter Left vertical fin.

1.13 Medical and pathological information

The PNG State pathologist carried out a post-mortem on the deceased pilot. A superficial oblique incision wound was identified on the right eyebrow with evidence of brain swelling (edema¹²).

The Pathologist reported that the pilot sustained blunt force trauma to the head at the time in which the aircraft impacted water, and subsequently drowned due to aspiration of seawater.

1.14 Fire

The passenger did not give any indication that there was any concern from the pilot about the presence of fire or smoke.

Due to the wreckage being unavailable for examination, the investigation could not confirm information relating to pre- or post-impact fire.

1.15 Survival Aspects

ICAO Annex 13 requires the search and rescue activities to be addressed in an investigation of an aircraft accident. Search and rescue activities are covered in the later sections of this report.

¹² A condition characterized by an excess of watery fluid collecting in the cavities or tissues of the body as a result of brain trauma.

1.15.1 Emergency Locating Transmitter (ELT)

The aircraft was fitted with an Artex C406-2 HM series emergency locator transmitter (ELT).

The Artex C406-1 HM transmits on all three nominated ELT frequencies (121.5/243.0 and 406 MHz). The ELT automatically activates when certain G-forces act on the aircraft and transmits the standard swept tone on 121.5 and 243.0 MHz.

It also transmits a 406 MHz encoded digital message to ATS via the COSPAS-SARSAT¹³ satellite system.

There was no ELT activation message received by ATS on the day of the accident. The investigation was unable to recover the ELT and therefore could not determine its status and why it did not activate.

1.15.2 Search and Rescue

1.15.2.1 General

Papua New Guinea is a contracting state to the Convention on International Civil Aviation Organization (ICAO) and is responsible to provide search and rescue services in accordance with *ICAO Annex 12*.

Section 8A of the Civil Aviation Act 2000 (As Amended) provides for the Minister to *establish, maintain, and operate a search and rescue co-ordination centre to co-ordinate and conduct aviation search and rescue operations*.

According to Section 8B of the Civil Aviation Act 2000 (As Amended), the Minister may direct CASA PNG, PNG ASL or other agencies under his responsibility to:

- (a) *operate and maintain the search and rescue co-ordination centre established under Section 8A(1)(a); or*
- (b) *co-ordinate, or participate in the co-ordination of any search and rescue operation specified in Section 8A(1)(a); or*
- (c) *perform, or participate in the performance of any search and rescue operation specified in Section 8A(1)(a); or*
- (d) *exercise any or all the powers of the Minister under Section 8A(1)(b) and (c) and Section 8A (2), as duly authorised by instrument of delegation.*

On 9 July 2018, the Minister for Civil Aviation adopted a Safety Action following a safety recommendation issued by AIC on 17 April 2018 and delegated the function of Rescue Coordination Centre (RCC) to PNG Air Services Limited (PNGASL) under the provisions of the Civil Aviation Act 2000 (As Amended).

1.15.2.2 Search and Rescue related to P2-TAH

According to the chronology of search and rescue events as informed by PNGASL, the pilot's last communication with ATS was at 00:49, when he reported he was operating below 5,000 ft and provided a revised estimated time of arrival (ETA) at Tokua at 01:25 (see Appendix B). The Moresby FIS Officer's statement and P2-TAH flight progress strip indicated that the pilot was requested to call Tokua Tower at 25 DME (refer to Appendix A).

There was no evidence indicating that the pilot broadcasted a Mayday.

All recorded SAR events from the time Tokua Tower commenced radio communication checks to the time the initial notification report was released, are outlined in the P2-TAH Search and Rescue Timeline in Figure 5.

¹³ A satellite system designed to detect and locate activated distress beacons transmitting in the frequency band of 406.0-406.1 MH. Source: *ICAO /IMO IAMSAR MANUAL*

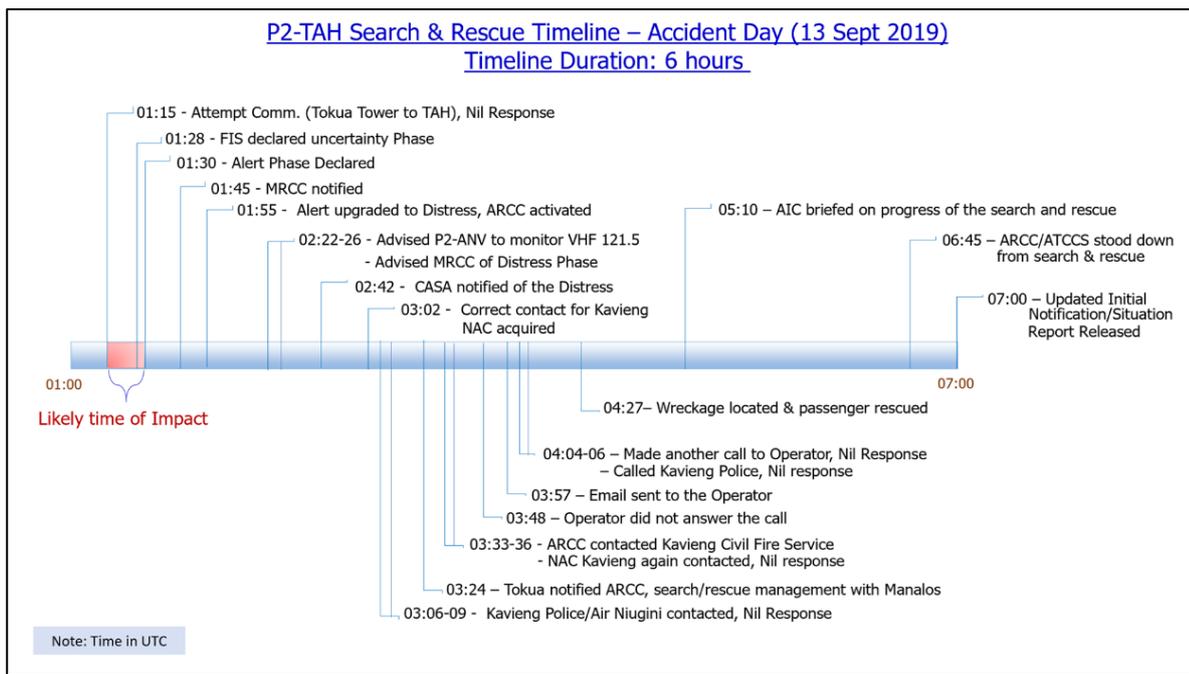


Figure 5: Search and Rescue Timeline related to P2-TAH.

1.16 Tests and research

According to the passenger, they had worn their life jackets before the flight commenced. He reported that when the aircraft impacted water, he got knocked unconscious. When he regained consciousness, he noticed that the helicopter was underwater and air bubbles were escaping through the forward windshield frame. He looked to the right and saw that the pilot was missing.

The passenger reported that he removed his seatbelt and followed air bubbles through the forward windshield frame and swam to the surface and inflated his lifejacket. After surfacing, the passenger recalled sighting the pilot at a distance and tried calling out to him but because it was windy and the waves were almost 5 m high, he lost sight of the pilot again. That was the last time he saw the pilot.

The passenger stated that he was washed to shore. He was later rescued by the crew of the search helicopter, P2-NTI.

According to the crew of the P2-NTI, the pilot's body was found later that day by local villagers, floating approximately 200 m from where they believed the P2-TAH accident occurred. A life jacket was found strapped to the pilot's body, but not inflated.

The pilot's life jacket was tested the day after the accident, and it inflated normally (see Figure 6).



Figure 6: Testing the pilot's life jacket.

1.17 Organisational and management information

1.17.1 General

1.17.1.1 Tribal Aurora Helicopters (Operator)

Tribal Aurora Helicopters is a rotary wing helicopter charter company based at Jackson's International Airport, National Capital District. P2-TAH was the first and only helicopter being used for their air operations at the time. The company had been in operation for 3 months before the accident.

At the time of the accident, the Operator had a valid and current Aircraft Operator Certificate (AOC 119/083).

The Operator had a Service Level Agreement (SLA) with North Queensland Aviation Services (NQAS) for carrying out its Maintenance Services (Refer to Section 1.17.2).

1.17.2 Operational procedures

1.17.2.1.1 Flight Crew Competency Checks

PNG CAR Part 136.907 *Flight Crew Competency Checks* states.

- (a) A holder of an air operator certificate must ensure that—
- (1) each pilot acting as pilot-in-command has, within the immediately preceding 12 months, passed a check of route and aerodrome proficiency that is administered by a flight examiner and that— (i) consists of at least one flight over one route segment and one or more landings at aerodromes representative of the operations to be flown; and (ii) establishes that the pilot can satisfactorily perform the duties and responsibilities of a pilot-in-command in air operations appropriate to this Part; and;
 - (2) each pilot conducting VFR operations has, within the immediately preceding 12 months, successfully completed a competency check, that is administered by a flight examiner and that covers procedures, including emergency procedures, of the pilot's flying skill in a helicopter type normally used by the pilot in the operations.

The investigation found that the pilot's recent checks included the Competency Check and the Route and Aerodrome Proficiency Check. The pilot's Route and Aerodrome Proficiency check was conducted on the Port Moresby to Kerema route on the 5th of July 2019. The last Competency Check for the pilot was carried out on 31 July 2019.

All checks were carried out under VFR as the pilot was only VFR rated; no Instrument Flight Rules (IFR) ratings.

The Operator's Training and Competency Manual, Flying Training, Section 3.6 (d) Route and Area Training also states.

Before a pilot may fly on a Company operation, he must be familiarised with the area he is to fly in by an approved pilot during a flight suitable for the purpose. Area of operations are designated as:

- i. Pre-flight preparation*
- ii. Typical helipads and landing area*
- iii. Terrain and hazards*
- iv. Aircraft Loading*
- v. Passenger briefing*
- vi. Use of checklist*
- vii. Documentation*
- viii. Seasonal weather characteristics*
- ix. Radio procedures, best frequencies for time of day*
- x. Procedures in the event of engine, systems, radio failures*
- xi. Local landmarks*
- xii. Emergency Response Plan procedures and local facilities*
- xiii. Any other pertinent matters e.g., location of fuel, etc*

A form, Area/Familiarisation Check, will be completed by the training pilot, to certify that the knowledge of the pilot is adequate to operate in the area, and added to the pilot's training file.

The investigation found that the pilot had not completed an Area/Familiarisation Check for the area operated.

1.17.2.1.2 VFR minima

The Tribal Aurora Helicopters *Flight Operations Manual (FOM)*, which is based on the provisions of the applicable Civil Aviation Rules, Section 2.8 *VFR Considerations* states that:

2.8.2 No pilot shall operate an aircraft under VFR:

- when the flight visibility is less than that prescribed for the corresponding class of airspace in Table 2, or*
- at a distance from clouds that is less than prescribed for the corresponding class of airspace in table 2.*

<i>Class of airspace</i>		<i>Distance from cloud</i>	<i>Flight visibility</i>
C		2 km horizontally 1000 feet vertically outside a control zone 500 feet vertically within a control zone	8 km at or above 10 000 feet AMSL 5 km below 10 000 feet AMSL
F	Above 3000 feet AMSL or 1000 feet above terrain whichever is the higher	2 km horizontally 1000 feet vertically	
	At or below 3000 feet or 1000 feet above the terrain whichever is the higher	Clear of cloud and in sight of land	5 km

Table 2: Airspace VFR Meteorological Minima.

Section 2.8.4 of the FOM states that:

“a pilot of a helicopter may operate in class F airspace with a visibility of less than 5km if maneuvered at a speed that will give adequate opportunity to other traffic or any obstructions in order to avoid collisions.”

The investigation found that that section of the FOM rephrased CAR Part 91.301(c)(2), but left a key word out (highlighted in bold in the paragraph below), misinterpreting the aim of the rule which states that a pilot-in-command of a helicopter:

may operate in Class F airspace with a flight visibility of less than 5 km if maneuvered at a speed that gives adequate opportunity to observe other traffic or any obstructions in order to avoid collisions.

Also, Tribal Aurora Helicopter’s FOM, Section 2.18 Meteorological Information and Procedures states:

2.18.3 A pilot-in-command shall not conduct a flight under VFR in an aircraft above more than broken clouds.

The investigation found that in contrast to the P2-MUM pilot electing to fly above the clouds at an altitude of about 5,600 ft, the pilot of P2-TAH opted to conduct the flight at lower altitudes, and inadvertently entered clouds, becoming unable to maintain to visual references.

1.17.2.1.3 Pre-flight Weather Information

According to Tribal Aurora Helicopter’s FOM, Section 2.18 Meteorological Information and Procedures states:

2.18.1 All pilots shall (if available) conduct VFR flights using meteorological information obtained from an approved aviation meteorological service organisation or otherwise from a reliable and accurate source.

2.18.2 A pilot-in-command shall ensure a flight under VFR is not commenced unless, if available, current meteorological information indicates VFR minima prescribed in Section 2.8 of this Manual can be complied with along the route. (See Table 2)

According to the Operator, the pilot regularly used the application “Windy”, which is a live online wind map and weather forecast tool, to gather pre-flight weather information.

The investigation could not determine whether the pilot had obtained relevant information about the existing weather conditions along the route, prior to departure.

1.17.2.2 Operators Emergency Response

The Operator stated that they had not been monitoring the helicopter on Spidertracks during the accident flight, however they were alerted by the pilot of P2-MUM at 02:03 that ATC was trying to contact P2-TAH and there was no response.

The Operator immediately commenced their *Emergency Response Plan 2 - Missing Aircraft* (see Appendix D) by discussing what was showing on Spidertracks at that time. The last mark showed the aircraft just off the shore of New Ireland, less than 1 minute from the land. Therefore, the Operator assumed the aircraft had probably landed due to weather and with only 30 second shutdown on the engines, that the aircraft had been powered off before another transmission could be sent from Spidertracks. This last known position of P2-TAH was passed to the pilot of P2-MUM, who relayed it to ATC.

1.18 Additional information

Not Applicable.

1.19 Useful or effective investigation

1.19.1 Google Earth Overlay Techniques

The Figure 2 captioned as *Depiction of the accident flight path, adverse weather conditions and Enroute (ENR) Chart superimposed on Google Earth* of this report was generated by superimposing data from sources:

- * Spidertracks
- * PNG Weather Services,
- * PNG ASL.

The application used for combining and superimposing the data together is the *Google Earth* by using the *add overlay image feature*.

2 ANALYSIS

2.1 General

The analysis of this report will discuss the relevant issues and circumstances resulting in the MBB - BK117 C-1 helicopter, registered P2-TAH impacting water approximately 2.7 nm South East of Silur Airstrip, New Ireland Province.

The investigation determined that there were no issues with the aircraft and all systems were generally operating normally. The analysis will therefore focus on:

- Operational aspects, including human factors, and
- Survival aspects

2.1.1 Operational aspects

Although the passenger stated that he observed weather starting to deteriorate as the flight was progressing, the satellite weather images for the day of the accident showed that the adverse weather conditions were already existent before the commencement of the flight. The investigation revealed that the passenger's perception of weather starting to deteriorate was because of the aircraft flying towards an area in which visibility was progressively below the minimums for VFR flights.

The pilot of P2-MUM departed Buka about 20 minutes after P2-TAH on the same route to Tokua, at 5,600 ft, and reported that he flew over dark clouds maintaining vertical separation along the South coast of New Ireland. However, P2-TAH's pilot decided to conduct the flight at a lower altitude, in which weather conditions did not allow him to maintain visual references throughout the entire route.

As P2-TAH's flight was progressing, the pilot diverted in an attempt to avoid adverse weather conditions. This led him to revise his ETA to Tokua, adding 15 minutes to his initial time.

The flight management actions adopted by the pilot as the helicopter was encountering adverse weather conditions consisted of a diversion and a descent to 200 ft, probably in an attempt to go below the cloud base to maintain or recover visual references. The investigation determined that those actions were ineffective as the helicopter progressively encountered adverse weather conditions during flight. This was observed when the AIC superimposed the flown track, taken from Spidertracks, onto the satellite weather image for that time, it was determined that the helicopter entered adverse weather.

As the flight was conducted into adverse weather conditions, the passenger was asked by the pilot to monitor the altimeter and to alert the pilot if the reading dropped below 200 ft. From the passenger statement, it was determined that by then the helicopter was flying into IMC.

The investigation determined that the pilot was not currently rated IFR, and the helicopter was not equipped for performing IFR operations, so when the pilot entered IMC, the workload would have become overwhelming to a point in which he was unable to effectively manage, monitor and control the flight parameters, tasking the passenger to monitor altitude. Under these circumstances, the pilot's situational awareness was compromised, and he was unable to identify when the helicopter descended towards the surface to a point in which the impact was imminent.

When the pilot of a helicopter does not have any fixed visual reference, the pilot tends to become disoriented with determining the actual position of the aircraft. This may be considered especially during operations over water where there is no stationary reference point.

In the context of the accident, the pilot entered IMC while operating over water. Due to reduced visibility in IMC, the pilot descended to about 200 ft to maintain separation from the cloud to continue with the VFR

operation. The investigation determined that while the pilot was operating at a low altitude, he may have been disoriented due to the lack of visual references and the constant wave motion.

2.1.2 Survival aspects

During the impact, the ELT and the Spidertracks SOS were not activated, which led to the Operator and the authority in charge of Search and Rescue coordination to be unaware of the occurrence until the ATS unit was unsuccessful in establishing communication with the aircraft, and subsequently declared the distress phases as deemed necessary.

The investigation determined that the Operator was not monitoring the status of P2-TAH, through Spidertracks, during the flight. Furthermore, after being alerted by the pilot of P2-MUM, the Operator assumed that P2-TAH had landed along the shores based on an estimation of time and distance from the last Spidertracks recorded position to the nearest land. The Operator estimated that the aircraft could land at the nearest shoreline and shutdown the engines within 1 minute and 30 seconds and would be the reason another Spidertracks recording was not registered. However, these estimations were based on an ideal straight approach to land on the nearest shores. This caused them to believe that the pilot landed and shutdown power before the next Spidertracks recording (2-minute interval).

3 CONCLUSIONS

3.1 Findings

3.1.1 Aircraft

- a) The helicopter was certified, equipped and maintained in accordance with existing rules and approved procedures.
- b) The helicopter had a valid Certificate of Airworthiness (CoA) at the time of the accident.
- c) The helicopter was airworthy when dispatched for the flight.
- d) The mass and the centre of gravity of the helicopter prior to departure were within the prescribed limits.
- e) There was no evidence of any defect or malfunction prior to impact.
- f) Fuel did not contribute to the accident.
- g) As per the Air Operators Certificate Operations Specification, the helicopter shall be operated under the VFR Operations.
- h) There was no evidence of pre-impact fire.
- i) The Emergency Locator Transmitter (ELT) fitted in the helicopter did not emit on impact.
- j) The aircraft was fitted with serviceable lifejackets. The occupants were using the lifejackets at the time of the accident.

3.1.2 Pilot

- a) The pilot was licensed and qualified for the flight in accordance with existing rules.
- b) The pilot was properly licensed, medically fit.
- c) The pilot's Class 1 Medical Certificate was expiring on the day of the accident.

3.1.3 Flight operations

- a) The flight was not conducted in accordance with the procedures in the company manual.
- b) The pilot carried out normal radio communications with the relevant ATC units.
- c) The pilot encountered deteriorated weather conditions, descending and conducting a low-level flight.
- d) The pilot diverted the track to new destination in an attempt to avoid adverse weather conditions and adding 15 minutes to his initial time.
- e) The pilot operating at very low altitude over the sea when he was tracking to the new destination and was unable to maintain visual references.
- f) When the pilot was manoeuvring to recover visual references, the helicopter descended and impacted the water.

3.1.4 Operator

- a) Tribal Aurora Helicopters was newly established and had been in operation for about three months.
- b) The Operator had a current Aircraft Operator Certificate at the time of the accident.

- c) The Operator had only one aircraft, P2-TAH, in operation.
- d) The Operator was not monitoring the status of P2-TAH, through Spidertracks, during the flight.
- e) The Operator assumed that P2-TAH had landed along the shore on an estimation of the time and distance from the last Spidertracks recorded position to the nearest land.

3.1.5 Flight Recorders

- a) The helicopter was not fitted with a CVR or FDR, neither they were required by the PNG Civil Aviation Rules.

3.1.6 Medical

- a) The Pilot's Class 1 Medical Certificate was expiring on the day of the accident.

3.1.7 Survivability

- a) The passenger exited the submerged aircraft through the windshield, which was detached from the aircraft during impact, swam to the water surface and inflated his life jacket. The passenger's life jacket kept him afloat until he swam to shore.
- b) The passenger was rescued by an aircraft participating in the Search and Rescue Operation.
- c) The pilot was fatally injured, and his body was later recovered by locals from sea, still suited in his undeployed lifejacket.
- d) The post-mortem examination concluded that the pilot succumbed to drowning.
- e) Tokua Tower commenced comms check on P2-TAH 10 minutes prior to SARTIME, but no comms was received from the aircraft. Tokua Tower should have declared the Uncertainty Phase by SARTIME, however, there was a two-minute delay as Tokua Tower decided instead to relay the information to Moresby FIS at which time Moresby FIS declared the Uncertainty Phase.
- f) The Alert Phase was declared within two minutes from the time the Uncertainty Phase was declared indicating that there was sufficient apprehension for the upgrade. However, it took 25 minutes for the Alert Phase to finally be upgraded to Distress Phase.
- g) The Centre Supervisor attempted to contact NAC Kavieng, but instead reached NAC Mt. Hagen. The investigation found that RCC Emergency Contact list used during the SAR of P2-TAH was not updated.
- h) PNGASL Moresby FIS used stand-alone HF radios to communicate with P2-TAH. The stand-alone radios do not record communication between aircrafts in uncontrolled air space and the Tower

3.2 Causes [Contributing factors]

During a VFR flight, the pilot of P2-TAH initially encountered adverse weather conditions and attempted to divert to avoid them. However, as the flight progressed, the pilot encountered further deteriorating weather conditions, to a point in which he was unable to maintain visual references.

The pilot descended to 200 ft probably in attempt to go below the cloud base. As the pilot was manoeuvring to regain visual references, he was unable to maintain effective control of the flight parameters of the helicopter, and impacted into the surface.

3.3 Other Factors

There were safety deficiencies or concerns that were identified during the course of the investigation that while not causal to the accident, nevertheless, should be addressed with the aim of accident prevention.

The investigation found non-contributory safety deficiencies. These are addressed in the Factual and Safety recommendations.

4 RECOMMENDATIONS

4.1 Recommendations

As a result of the investigation into the accident involving a MBB - BK117 C-1 helicopter registered P2-TAH 2.7 nm south east of Silur Airstrip, New Ireland, Papua New Guinea on the 13 September 2019, the Papua New Guinea Accident Investigation Commission issued the following recommendations to address concerns identified in this report.

4.1.1 Recommendation number AIC 20-R 25/19-1003 to Tribal Aurora Helicopters

Date Issued: 29 September 2020

The AIC recommends that Tribal Aurora Helicopters should implement procedures to effectively monitor its Aircraft Tracking System “Spidertracks” during their flight operations.

Action Requested

The AIC requests that Tribal Aurora Helicopters note recommendation **AIC 20- R 25/19-1003** and provide a response to the AIC within 90 days, but no later than 29/12/2020, and explain including evidence how Tribal Aurora Helicopters has addressed the safety deficiency identified in the safety recommendation.

Status of the AIC Safety Recommendation: Active

4.1.2 Recommendation number AIC 20-R 26/19-1003 to Tribal Aurora Helicopters

Date Issued: 29 September 2020

The Accident Investigation Commission recommends that Tribal Aurora Helicopters review and amend its Flight Operations Manual to ensure it is completely aligned with the relevant provisions of the PNG Civil Aviation Rules including, but not limited to, CAR Part 91 and CAR Part 136 as applicable.

Action Requested

The AIC requests that Tribal Aurora Helicopters note recommendation **AIC 20- R 26/19-1003** and provide a response to the AIC within 90 days, but no later than 29/12/2020, and explain including evidence how Tribal Aurora Helicopters has addressed the safety deficiency identified in the safety recommendation.

Status of the AIC Safety Recommendation: Active

4.1.3 Recommendation number AIC 20-R 27/19-1003 to CASA PNG

Date Issued: 29 September 2020

The AIC recommends that the Civil Aviation Safety Authority of PNG (CASA PNG) consider the findings and safety issues identified in the Final Report AIC 19-1003, disseminating the relevant information to the aviation community, and especially to helicopter operators, through Safety Promotion activities.

Action Requested

The AIC requests that PNG CASA note recommendation **AIC 20- R 27/19-1003** and provide a response to the AIC within 90 days, but no later than 29/12/2020, and explain including evidence how PNG CASA has addressed the safety deficiency identified in the safety recommendation.

Status of the AIC Safety Recommendation: Active

5 APPENDICES

5.1 Appendix A: FIS Flight Strip for the accident flight

AT5006	TAH BK17	BK 7	OP 0045	TK 25	15	UC0128
BKTK	0017	5	49	0140	✓	DN
					H	ANV
						MGT

5.2 Appendix B: Search and Rescue Events related to P2-TAH

P2-TAH Chronology of SAR Events	
Date: Friday 13/09/2019 - UNREPORTED ARRIVAL	
Aircraft callsign	P2-TAH (Kawasaki)
Operator	Tribal Aurora Helicopters (Port Moresby based)
Phase of Flight	Cruising
Type of Operation	Charter
POB	2
Last Reported Position	1049 LMT (Operations normal call) below 5000ft estimating Tokua 1125 LMT Position reported to Moresby FIS
Time (UTC)	Information
0115	i. Communication checks by Tokua Tower- Nil Response ii. Called adjacent units to establish radio comms - Nil response
0128	Uncertainty Phase Declared by Moresby Flight Information Service (Huon Sector)
0130	Alert Phase declared due to unreported arrival at Tokua Aerodrome
0145	Marine Rescue Coordination Centre notified of the Alert Phase
0155	Alert Phase upgraded to Distress Phase. Rescue Coordination Centre (RCC) activated.
0207	Called NAC and Air Niugini in Buka - Nil Response
0214	Contacted the Operator - Nil Response
0222	i. P2-ANV (PX) En route Tokua was advised to monitor VHF 121.5 - Reported nil distressed signal received ii. General broadcast to all aircraft within the P2-TAH flight track iii. PNG Air Services Limited Air Traffic Services (PNGASL)
0225	P2-ANV reconfirmed nil sighting of P2-TAH

0226	i. Called Marine Rescue Coordination Centre (MRCC) advising of the Distress Phase. ii. Also advised MRCC to do general broadcast to all the vessels within the distress vicinity for any possible sighting.
0229	Conducted plotting of last known position of P2-TAH
0242	Called and notified CASA PNG
0250	Centre Supervisor advised RCC on the last sighting of P2-TAH by Manalos Aviation, P2-MUM, at 0241 UTC on position 04°34'13" S, 153°04'29" tracking southern tip coastline of New Ireland Province 50 nm.
0255	Called NAC Kavieng - responded from Mt. Hagen due to shift. Acquired correct contact details for Kavieng NAC duty officer.
0302	Called NAC Kavieng - responded. Nil sighting or hearing of distressed aircraft within the vicinity.
0306	Called Kavieng Police station - Nil response.
0309	Called Kavieng Air Niugini for possible info - Nil response.
0311	Called Manalos Aviation Limited - Nil response.
0320	Called Manolos Aviation and got response. They advised to call back with an updated information.
0324	Tokua Tower advised RCC that Manolos Aviation Ltd was arranging search helicopter, P2-NTI, to conduct track line search for the distressed P2-TAH.
0333	Called Kavieng Civil Fire Service - Responded with negative sighting or hearing of any distressed aircraft.
0336	Called NAC Kavieng to follow up on any latest information - Nil response.
0348	Called Tribal Aurora (Operator) - Nil response.
0357	Due to nil response from Tribal Aurora, an email was sent.
0404	Called the Operator - Nil response.
0406	Called Kavieng Police - Nil response.
0411	Called Tokua Tower and was notified that P2-NTI was conducting track line search within the distress location. Search endurance was 2 hours.
0421	Called Heli Solutions to enquire for available Tribal Aurora's contact details - Nil response.
0427	P2-NTI reported through Centre Supervisor that the wreckage has been located at the position 04°32'52" S, 153°03'59". 1 survivor rescued. Information relayed to acting CEO PNGASL.
0431	Issued INI.
0433	Jackson's Tower relayed similar information as P2-NTI
0436	Called Tokua Tower to confirm the rescue information - nil response.
0440	Called Tribal Aurora to confirm the rescue information - responded with negative information on the wreckage and rescue.
0450	Called Tribal Aurora and advised him confirming the crash/wreckage based on the updated information.
0451	Called Tokua Tower for any further information. No new information.
0452	Received confirmation from Centre Supervisor - survivor rescued and pilot still missing with helicopter.
0502	Advised Tribal Aurora on the updated information. The Operator was also in contact with PNG AIC.
0505	Tokua Tower advised - P2-NTI was returning from the search area. There was 1 survivor. Presence of debris within the crash site.
0510	Provided update to PNG AIC.
0515	RPNG PPC Rabaul and Nakatani PPC briefed with an updated SAR information. PPCs mentioned that they will be in contact with Manolos Aviation, Ulaveo.
0530	i. Provided update to MRCC and also advised them to maintain watch on any information from the vessels within the crash site of missing person in water. ii. Updated PNGASL management.
0645	RCC/CS standing down. MRCC also notified.
0700	Issued updated INI and SITREP.

5.3 Appendix C: Search and Rescue Related to P2-TAH

AIC 17-R03/17-1004

4.1.1 Recommendation number AIC 17-R03/17-1004 to the Minister for Civil Aviation

The PNG Accident Investigation Commission recommends that the Minister for Civil Aviation, in compliance with *Sections 8A and 8B of the Civil Aviation Act 2000* (as amended in 2016), should ensure that a Rescue Coordination Centre is established, maintained, and operated, to co-ordinate and conduct aviation search and rescue operations in PNG. This will also ensure compliance with *ICAO Annex 12*, thereby specifically complying with *Section 8A(1)(b)(ii)* of the Act

Section 8A for the CAA 2000 (as amended 2016)

“8A. SEARCH AND RESCUE OPERATIONS.

(1) The Minister -

- (a) shall establish, maintain, and operate a search and rescue co-ordination centre to co-ordinate and conduct aviation search and rescue operations; and
- (b) may exercise any powers that may be necessary or desirable -
 - (i) for effective co-ordination and performance of a search and rescue operation specified in Subsection (1); and
 - (ii) to implement any international convention or agreement relating to search and rescue to which Papua New Guinea is a party; and
- (c) may appoint persons to, either generally or in any particular case, participate in or co-ordinate a search and rescue operation specified in Paragraph (a).

(2) The Minister may authorise the payment, out of money appropriated for the purpose by Parliament, of an amount that the Minister considers appropriate to -

- (a) any person who assisted in a search and rescue operation specified in Subsection (1)(a) at the request of a person appointed under Subsection (1)(c); or
- (b) the owner of any vehicle, ship, or aircraft used in a search and rescue operation specified in Subsection (1)(a) in response to a request by a person appointed under Subsection (1)(c).

Section 8B for the CAA 2000 (as amended 2016)

8B. MINISTER MAY DIRECT AGENCIES WITH RESPECT TO SEARCH AND RESCUE OPERATIONS.

The Minister may direct CASA, Papua New Guinea ASL or any government agency for which the Minister is responsible and whose functions are consistent with search and rescue operations, to do any or all of the following:

- (a) operate and maintain the search and rescue co-ordination centre established under Section 8A(1)(a); or
- (b) co-ordinate, or participate in the co-ordination of any search and rescue operation specified in Section 8A(1)(a); or
- (c) perform, or participate in the performance of any search and rescue operation specified in Section 8A(1)(a); or
- (d) exercise any or all of the powers of the Minister under Section 8A(1)(b) and (c) and Section 8A(2), as duly authorised by instrument of delegation.”

5.4 Appendix D: Emergency Response Plan 2- MISSING AIRCRAFT: FLOWCHART

